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Lessons from the demonstration Management Improvement Program

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Abstract. The Management Improvement Program, a process based on Organizational Development principles and methods, was applied to an irrigated agricultural system in Arizona, USA. The MIP seeks to improve management and performance of the agricultural system through structured diagnosis, planning, and implementation activities with the participation of system stakeholders. An equally important objective of the demonstration project was to identify strengths and shortcomings of the MIP methodology and to generate recommendations for managing its future applications. The data used to analyze the demonstration project's management were obtained through formal interviews and informal conversations with individual participants, program review and feedback sessions, and records of meetings and individual communications.

Lessons about the project's management are categorized in six areas: the initial exploration phase, initial planning, participant on-boarding, formation of the process management team, development of the local control group, and evaluation of the project. A key aspect of conducting a change process such as the MIP for improving the performance of agricultural systems, is that issues affecting the system may be difficult to identify early in the process or may require longer-term solutions, extending beyond the life of the formal process. Because of this uncertainty, a detailed action plan, the role of participants, and measures for evaluating progress or impact are also likely to be uncertain early in the project. Nevertheless, it is critical that the application, including these elements, be defined as concisely as possible, especially relative to scope and funding, while still allowing the flexibility to address a potentially wider range of issues. Given the nature of the MIP, those responsible for its management need to be technically proficient, experienced with team management techniques, sensitive to the local political environment of natural resource management, and when necessary, willing to challenge stakeholders' initial understandings of issues.

Key words: integrated resource management, interdisciplinary studies, irrigation management, irrigation performance, managed change, strategic change, strategic management, sustainable agriculture

Abbreviations: ADA – Arizona Department of Agriculture; ADEQ – Arizona Department of Environmental Quality; ADWR – Arizona Department of Water Resources; ARS – USDA-Agricultural Research Service; BOD – Board of Directors; CAP – Central Arizona Project; CAWCD – Central Arizona Water Conservation District; DA – Diagnostic Analysis; FSA – Farm Services Agency; ICG – Interim Coordinating Group; IMIP-CG – Interagency Management Improvement Program Coordinating Group; IMS – Irrigation Management Services; MIP – Management Improvement Program; MSIDD – Maricopa-Stanfield Irrigation and Drainage District; NRCS – USDA-Natural Resources Conservation Service – UA-CA – University of Arizona College of Agriculture; UA-CE – University of Arizona Cooperative Extension; USBR – USDI-U.S. Bureau of Reclamation; USDA – United States Department of Agriculture; USDI – United States Department of Interior; USWCL – USDA-ARS United States Water Conservation Laboratory; WP NRCD – West Pinal Natural Resource Conservation District

Introduction

Improving the performance of irrigated agricultural systems requires a systematic process of diagnosis, planning, and implementation, involving farmers, water supply organizations, governmental organizations, and other relevant agricultural system stakeholders. The Management Improvement Program (MIP) is such process. A demonstration MIP was carried out in the service area of the Maricopa-Stanfield Irrigation and Drainage District (MSIDD), Arizona, USA (Dedrick et al. 2000a). The demonstration project began in early 1991 and formally ended in early 1994. It was guided by a process management team identified in this document as the MIP Management Team.

An overview of the MIP methodology and details of the application are provided in a series of companion papers (Dedrick et al. 2000a; Dedrick et al. 2000b, Clemmens et al. 2000, Wilson and Gibson 2000, and Bautista et al. 2000). As discussed in the first reference, the MIP is based on managed change processes specific to irrigated agriculture. These processes were initially developed in the 1970s and 1980s as part of the Water Management Synthesis II Project, an irrigation development effort supported by the U.S. Agency for International Development and initially applied to irrigation projects in Asian countries (Clyma & Lowdermilk 1988). Because of the differences in economic, technological, organizational, social, and political conditions of agriculture between the western United States and the agricultural regions where the MIP approach was first developed and applied (Dedrick et al. 2000a), the demonstration MIP was conceived and carried out primarily as a research program. Therefore, in addition to objectives associated with improving the performance of the local irrigated agricultural system, equally important objectives of the demonstration were to assess

the strengths and weaknesses of the methodology, its viability as a tool for improving resource management in a U.S. agricultural setting, and to suggest improvements for future applications. The program was conducted under the leadership of the U.S. Department of Agriculture-Agricultural Research Service (ARS) U.S. Water Conservation Laboratory (USWCL) in Phoenix, Arizona, USA.

Drawing on the demonstration project experiences, the objectives of this paper are to identify the major lessons learned and formulate strategic recommendations for managing future MIP applications.

Data sources

The demonstration MIP was documented thorough records of individual and group meetings, activities, and communications. Structured activities were organized at various stages of the project by the MIP Management Team to obtain participants' feedback, and a study was conducted at the end of 1993 to evaluate the MIP approach and assess the project's impact on the area's irrigated agricultural system (Le Clere et al. 1994). Additionally, members of the MIP Management Team have maintained contact with project participants and, through these informal discussions, have continued to obtain feedback on the process.

MIP lessons

Initial exploration and obtaining a mandate to proceed

In principle, the MIP is a three-phased process: Diagnostic Analysis (DA), Management Planning, and Performance Improvement (Dedrick et al. 2000a). In practice, initial exploration and other activities prior to start-up of the DA phase are extensive as well as critical to the project's success. The initial exploration serves to

- define the intervention's objectives and its expected outcomes,
- differentiate between broad objectives/outcomes and the range of potential changes/activities that may be required in response to the DA findings, and
- identify stakeholders who need to be involved and define their roles.

Sponsor and stakeholder commitment to the process will depend on how

clearly these items are defined during the initial exploration. Funding for this initial activity is considered part of the project's cost.

Exploratory activities for the demonstration MIP began in 1989 when the USWCL conducted a truncated DA in a southwestern U.S. irrigation district (Palmer et al. 1991). The intent was to learn to use the DA concepts and procedures to characterize district operations and identify opportunities for improving water delivery. The DA team in this case was not interdisciplinary; hence, aspects such as crop production and economics were not considered. From this experience, the following became apparent to the research team:

- An analysis of an irrigation district's operations alone, without an understanding of other agricultural system components (e.g., crop production systems, economics) was likely to produce information of limited value that would not lead to changes in practices.
- District personnel and farmers needed to be involved in development of the research plan and perhaps in the data collection and interpretation processes. Otherwise, results would be challenged.

Based on this experience, two of the authors introduced the MIP process to a number of federal and state-of-Arizona agencies later in 1989. These organizations play key regulatory and service roles in the state's irrigated agricultural production system and are listed in Dedrick et al. (2000a). Discussions were held first with individual representatives of each organization and later with all the involved parties in a structured workshop. These entities agreed to sponsor a demonstration of the MIP process. With ARS, they formed the Interagency Management Improvement Program Coordinating Group (IMIP-CG) to oversee the project. All sponsoring agencies appeared to be equally clear about the purpose of the MIP, and commitments within individual agencies appeared to be clearly secured. With one exception, representatives from the various agencies were upper level managers with authority to commit resources.

The IMIP-CG met three times during 1990. During a three-day workshop in April, the group explored the purposes of the intended application. A team management specialist helped plan and facilitate the meeting, allowing members to experience first-hand the planning and team-building approaches (such as the Team Planning Methodology; Levine 1989) that would be used during the demonstration. Purpose and intended outcomes were defined (Appendix A). These definitions were reached through detailed discussions of organizational interests, agendas, mandates, and perceived benefits to each agency from their participation. The definitions reflect, first, the IMIP-CG member agencies' understandings of the MIP as a broad tool for managing

change in irrigated agricultural regions. Second, they are consistent with those agencies' common interests in water resource management in the state of Arizona. Third, they denote the agencies' appreciation of interdisciplinary analysis and coordinated multiagency planning and implementation as a promising approach to some of their water management goals. The group also defined the criteria for selecting the district where the process would be tested. Key criteria were voluntary participation, potential for transferring learnings from the application to another district, and high potential for success in the initial application.

Over the next three months, the IMIP-CG detailed the scope of work, personnel requirements, and projected costs. By the end of July 1990, this information was summarized in a General Work Agreement. The sequence of activities to be undertaken during the DA and planning phases were outlined based on the experiences of the Water Management Synthesis II Project, the MIP's predecessor program. Because the client area and issues were still unknown, the work agreement outlined implementation phase activities in less detail. For the same reason, the document stated that initial personnel requirements and cost projections would be revised to reflect the specific issues to be addressed. This document served as the basis for agreements among the cooperating organizations to provide direct and in-kind financial support to the project.

The initial exploration, as carried out, was successful in the following respects:

- It created the needed level of understanding and excitement about the process among agencies.
- It developed objectives that were broad enough to set the process in motion and adaptable to the particular circumstances of the irrigated area that would be selected.
- It laid the foundation for interagency agreements and secured the commitment of most of the participating agencies; these commitments remained strong throughout the intervention.

The initial exploration was less successful in the following areas:

- It did not recognize that some commitments by various organizations/individuals were not properly mandated.
- It did not establish how the program's success would be measured.
- It did not state how funding would be pursued, nor did it distinguish between funding to support the process (the Management Team, activ-

ities, and events) and funding to implement identified changes and improvements.

In the case of one agency, insufficient discussions were held with the senior leadership to secure an appropriate mandate. The problem became evident shortly before the DA phase got underway when that organization's representative to the IMIP-CG left the organization. Because of the inadequate mandate and lack of continuing representation, participation by other members of that organization was not clearly defined as to who would be involved, duration of involvement, or sources of financial support for participants. This situation created constraints and conflicts for members of that organization who did participate.

The purpose and expected outcomes of the demonstration MIP, as given in Appendix A, were relatively broad and applicable to many irrigated areas in the U.S. Measures for assessing the project were identified in terms of outcomes related to water management. Thus, the definition of success in the initial conceptualization of the MIP focused on the potential for improving water management practices in the area. It did not, as ultimately occurred in the demonstration, consider the degree to which these changes depended on related changes in the agronomic, economic, and management environment under which farmers operate.

Introducing a process such as the MIP to an organization and securing a mandate is complex and sometimes lengthy. Potential participants need to consider the benefits and costs related to their involvement, while MIP sponsors and leaders need to determine participant's level of interest and willingness to commit resources. Discussions should occur on several levels: between the organization and the project leaders, within the organization, and in conjunction with other potential partners to determine ways in which involvement might be leveraged by planned collaboration. During this exploration, project leaders need to involve appropriate management levels that influence agency program direction and resource allocation. The support of these "gate-keepers" (Cunningham 1993) should be secured prior to start-up. In general this was done effectively in the pilot. However, there were instances when difficulties in maintaining agency support likely were related to "gate-keepers" being inappropriately identified or insufficiently informed to sustain their grasp of the process throughout the demonstration.

Initial planning

Specific planning for the MSIDD demonstration began in January 1991 and culminated in a two-day workshop in early March of that year. IMIP-CG members, upper management of MSIDD, and one member of the district's

board of directors (BOD) attended the workshop. The initial work agreements of the exploratory phase were meant to be refined in cooperation with all partners. However, the statements of purpose and expected outcomes and the broad plan for carrying out the application that were approved at that workshop essentially replicated those of the initial exploration.

More detailed initial planning was not conducted for several reasons. One was the project leaders' intent to define project objectives broadly and allow issues to be identified through the DA and planning activities. There was also concern that focusing on more specific issues would cause the objectives and expected outcomes to center on district operations, and that this narrow focus would jeopardize the district's involvement. Project leaders were aware that the roles of participants would have to evolve during the demonstration project, but it was less clear how and when this would happen. While one BOD member participated in the discussions, it was unclear whether the BOD should be the source of farmer representation for the MIP. Further, because the district had expressed concerns about outside interference in their internal affairs, there was no discussion of how roles might evolve, potentially bringing some agencies into more prominent roles. A final reason for not pursuing more detailed planning was that the project leaders' wished to capitalize on the excitement created among participants during the exploration phase. This high level of enthusiasm was critical to the success of the DA phase activities.

The general work agreement was sufficient to set the process in motion, but a more detailed document would have prevented some difficulties during the planning and implementation phases. The MIP Evaluation Study (Le Clere et al. 1994) recommended that this initial planning phase be given greater attention in future applications. Some problems that resulted include the following:

- Because the application's purpose and expected outcomes were defined broadly (Appendix A), they were difficult to attain or measure or to use for implementation guidance. The transition from the DA phase to action planning and implementation would have benefitted from more specificity.
- Since a specific set of expected outcomes was not defined, time lines and needed resources were not well defined. This hindered efforts to update project duration and cost estimates.
- The need for ultimate stakeholder ownership of the process was recognized; however, a process was not delineated to phase out the roles of USWCL and the MIP Management Team and transfer control of the project to the stakeholders. This complicated the establishment of a local control group.

– Specific measures of project success were not defined at the outset, which made assessment of MIP impacts more difficult.

The first two items, above, are discussed in the following paragraphs and the last two later, in separate sections.

The MIP Management Team conducted two workshops in April 1992 (Dedrick et al. 2000a), based on the DA findings. They expected the workshops to lead to a common understanding by all stakeholders of the performance of the MSIDD-area agricultural system and to the identification and prioritization of issues that needed to be addressed. They also expected MSIDD and participating agencies to seize the opportunity to address those issues by launching individual or collaborative performance improvement initiatives. The process was successful in broadening the participants' understanding of the agricultural system. Converting that understanding into initiatives, however, involved complex issues, some of which were beyond the direct control of the stakeholders (e.g., the price of commodities, Dedrick et al. 1992a). Nonetheless, two significant initiatives were proposed (Dedrick et al. 2000a). Other opportunities were not pursued at that time.

Identifying some attainable expected outcomes would have been feasible within the broad framework established during the initial exploration despite the uncertainty about major issues. A concise set of expected outcomes at that point would have enabled participants to address issues that could be accomplished over a limited time with existing resources. That, in turn, could have facilitated the transition from the DA to further collaborative action on more complex issues or those requiring additional funding. As an example, improved water delivery service was considered part of the overall expected outcome of improved water resource management (see Appendix A, third expected outcome). During the initial planning, this outcome might have been stated more specifically, in collaboration with MSIDD, as the development and initial implementation of an action plan to address opportunities in water management.

Opportunities for improving water deliveries were, in fact, identified during the DA process, and to its credit, the district acted on some of those opportunities (Bautista et al. 2000). However, the district acted unilaterally without further analysis of the data. It is difficult to say if a more structured approach, in consultation with participating agencies and farmers, would have led to a different set of delivery service changes or greater impact from the implemented changes. Such an approach would have allowed the district, farmers, and agencies to collaborate on the issue, consistent with MIP principles, and ultimately would have provided a tangible measure of MIP accomplishment for all involved.

The initial projection of duration and cost was about 18 months and $160,000, excluding in-kind contributions by participating entities. The actual cost was about $900,000 over 34 months. One factor accounting for the difference was the lack of a precedent for application of a complete MIP cycle as a continuous change effort. The process and the associated time required to achieve widespread understanding and involvement were underestimated (e.g., challenges during the DA data synthesis and feedback with MSIDD management, see Dedrick et al. 2000b). Also, the scope of some activities had not been clearly conceptualized, in particular the development of a local coordination group to carry on MIP activities after the formal intervention and evaluation. Finally, farmers, agency and district representatives, and even members of the MIP Management Team could not dedicate undivided time to MIP activities because of other responsibilities. Therefore, MIP activities occurred intermittently over a longer period than was anticipated.

Following are some lessons that can be extracted from the foregoing:

- At whatever level of detail is feasible during the initial planning activities, expectations relating to the MIP's purpose, expected outcomes, time lines, and required resources should be formulated in consultation with each key participating agency and discussed in both individual agency and group meetings. Direct and indirect, and long- and short-term costs and benefits need to be identified in these discussions. These expectations were complicated by the fact that the main motivation for the demonstration application was interest in researching the methodology. In the future, it is expected that an MIP will be launched in response to a well-defined problem affecting a community. In that case, defining expectations will be more straightforward.
- It should be emphasized to all participants that the initial planning is intended as a starting point, applying the principles and approaches of the MIP model in a flexible manner. Detailed planning for significant aspects of the MIP will depend on learnings from the DA. Decisions made at the beginning of the demonstration program reflected concern about political sensitivities. In future applications, a specific set of objectives/initial outcomes must be agreed upon that consider any local sensitivities.
- Participants also need to be clear that the application must be carried out, to the extent possible, in accordance with basic MIP principles and approaches (e.g., inclusion of all appropriate stakeholders, interdisciplinary data collection and analysis, Action Research-type feedback, collaborative planning and implementation). Otherwise, the application should not be carried out.

- Preliminary decisions on sources and levels of funding need to be made in advance of further detailed planning. Stakeholders need to be clearly aware that resources will be required, first, to support an initial MIP cycle (diagnosis, planning, implementation) and its management and later, to support programs planned and implemented during the planning and implementation phases. Ideally, one or more major mandators will provide a base of overall support for the former, including resources for any outside expertise needed.
- Participants need to be made aware that their roles in the MIP activities may change as a function of issues that emerge during the transition from diagnosis to planning and implementation. The initial planning needs to include a discussion of how unforeseeable changes, which are sure to occur, will be dealt with. Some questions to consider are

  - What processes will be used to monitor, assess, and adjust MIP planning and program progress?
  - How will agency mandates to the MIP effort be maintained through changes in personnel and/or organizational structure?
  - What types of problem-solving processes will be used within an agency or among agencies to address changing circumstances as they arise?

Bringing participants on-board

Starting with the initial exploration and continuing throughout the entire process, an MIP application must develop an approach to introduce potential participants to the MIP. Such an approach must provide them with an in-depth understanding of

- its intended purpose and outcomes;
- the principles upon which it is founded–shared understanding, communication, collaboration (see Dedrick et al. 2000a);
- the benefits to the community/area and to other participants; and
- the significance of those benefits.

In organizational management, the above process is often referred to as "bringing participants on board."

The process of on-boarding MSIDD as the host district illustrates the range and extent of activities that need to be undertaken in a future application. Because the MIP is, first of all, a collaborative process, a key criterion for selecting the irrigation district was its willingness to participate. Fourteen districts in Arizona were invited to participate, initially by letter. Six did not

respond, seven declined, and one did not meet some of the selection criteria established during the initial exploration. While perceiving benefits from an MIP, the declining districts gave various reasons for not participating: their problems were not serious enough to warrant such an extensive process; there was a potential for conflict; they planned other kinds of studies; they were concerned that several bureaucracies would be telling the farmers how to farm; they feared the DA; and the district's staffing was insufficient. This response, while disappointing, was not unexpected. It is difficult to convey a complete concept of the program and its possible benefits through a letter alone. However, the letter of invitation brought the MIP to the attention of all districts and gave them an opportunity to participate, which was an important political consideration.

Telephone and face-to-face discussions were held with various districts, but they continued to decline. MSIDD, the district that ultimately hosted the application, declined the letter of invitation but later accepted after several presentations and discussions with its management and BOD in late 1990. The district's general manager played a pivotal role in securing the approval of the BOD.

Members of the district's management were involved in some of the initial discussions and played an active role in the development of the specific work agreement. They were instrumental in the development of the DA research plans and key in the review of the results. Despite their extensive involvement, managers and BOD members continued to express concerns about "outsiders" (i.e., representatives of any entities other than MSIDD or members of the MIP Management Team) interfering in their affairs. These concerns reached critical levels during the development of the DA report (Dedrick et al. 2000b) when it appeared the district might end its participation. This crisis situation led to a renewed discussion of the MIP's purpose and principles. During one of the discussions, a key member of the district's management staff exclaimed, "I've got it!" and sketched a rough circular diagram with the farmer in the center and support and regulatory organizations joined by concentric orbits around the target (Figure 1). This diagram was symbolic of the manager's new level of appreciation of the MIP, and soon became symbolic of the MIP. He and others came to understand that the focus of the application was not the district itself but, rather, the agricultural production system, that the district was a key element of that system, and that collaboration with other organizations was needed to facilitate change. This new level of understanding was reached about a year after the district agreed to host the demonstration.

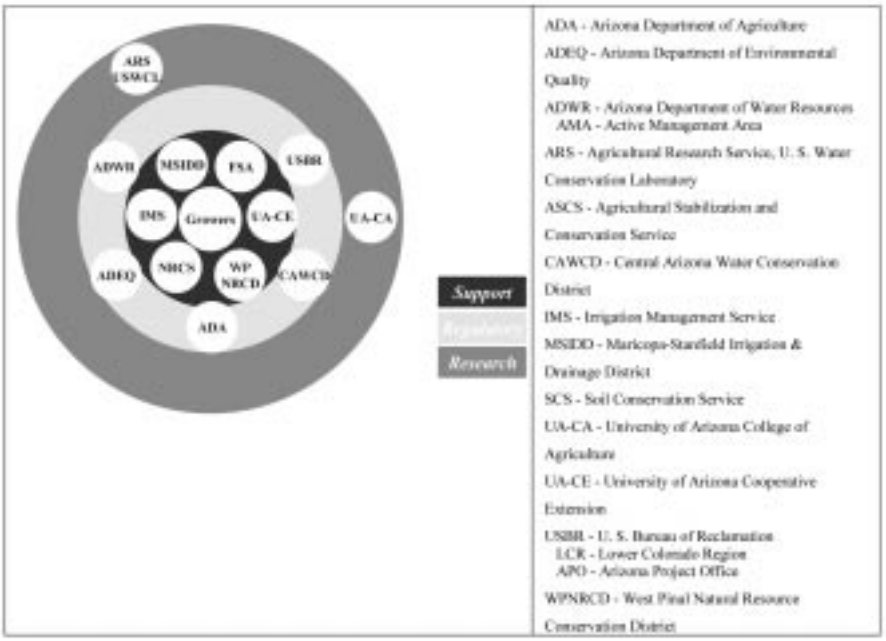

Figure 1. The MSIDD irrigated agricultural system and its stakeholders. The schematic identifies and categorizes the entities that participated in some way in the Demonstration Management Improvement Program in the MSIDD Area. Generally, they are public sector entities. As profitability and sustainability of irrigated agriculture are most directly in the hands of the area's farmers, and as they are the intended focus of the missions of the others involved, the farmers are at the center of the schematic. Each of the concentric bands around the farmers shows agencies or organizations whose nature of involvement in the area's agriculture is generally similar. Moving outward from the farmers, the first band includes organizations or entities directly supporting agriculture in the MSIDD area; the second includes organizations with primarily regulatory missions although they may also have some support functions; and the furthest includes the two research and/or education organizations that were involved.

Following are some of the lessons that can be derived from the above and from the on-boarding experiences of other participants:

– The MIP is a complex concept because it focuses on the agricultural system and not on individual components. Unless this focus becomes the norm, bringing participants on board the process will be a challenge. The breadth of the demonstration project's objectives made this on-boarding even more challenging. Also, as stated earlier, participants likely would have understood the MIP more easily if the application had been carried out in response to a well-understood issue in the community and if stakeholders had been more directly involved in the initial exploration.

- Because of the district's key role, a substantial amount of time was devoted to bringing its members on board, yet an in-depth understanding of the objectives of the process developed slowly. To a lesser or greater degree, this understanding developed slowly for most other participants. Hence, stakeholders need to refine and restate the application's objectives and principles periodically to maintain proper focus and involvement and to develop gradual ownership of the process.
- As discussed in the previous section, on-boarding of agencies must include individuals at various levels, including those with authority to provide the needed human, technical, or financial resources.
- Given that the MIP activities will be carried out over a significant time period and that changes in stakeholder representation or agency personnel are likely to occur, either external management support to perform on-boarding activities is needed over an extended period, or participants need to develop a structured approach during the process that will enable them to respond effectively to such changes.

MIP management team

The core of the five-person MIP Management Team began to function in 1989 when two of the authors led an initial exploration of the process. A management specialist with experience in overseas development projects assisted the team through the establishment of the IMIP-CG in April 1990 and the decision a year later to proceed with a pilot MIP but did not become a member of the team. The participating agencies recognized that a management team would be needed and that this team would require technical expertise, experience with DA and other MIP precursors, experience with group processes and large change efforts, knowledge of local institutions and culture, and credibility as a neutral organization. The IMIP-CG asked the USWCL to serve as the lead agency and to provide part of the funding for management and MIP consultants. Two more members of the team, a strategic planning and process management specialist and a communications and administrative coordinator joined the team prior to the April 1991 workshop. The final member joined in late 1992 to begin the processes of documenting and evaluating the MIP. This team continued to operate until early 1994 when the demonstration formally ended.

The MIP Management Team performed several key functions throughout the demonstration project, some dealing with project leadership and others with project management. Some of the functions were

- providing a compelling yet realistic vision of the MIP to current, new, and potential participants–regardless of the clarity of the initial vision,

the MIP Management Team needs to foster continuous development of a refined collective vision;
- assisting the development and organization of the interdisciplinary and multistakeholder teams responsible for carrying out the specific program tasks;
- organizing and facilitating the planning meetings during which the interdisciplinary or multistakeholder teams develop task-specific action plans;
- maintaining communications with participants, inside and outside the meeting rooms, individually and collectively;
- maintaining records of activities and developing pertinent documentation;
- providing periodic feedback on progress to the project's sponsors and participants;
- troubleshooting.

Two significant functions of the MIP Management team were balancing the contributions of all participants and assuring appropriate elements of action and process. With respect to the first, the MIP Management Team needs to gain the trust of participants; demonstrate neutrality and a sensitivity to the local culture and sometimes to personality differences; and encourage less vocal participants to express their opinions by challenging too hasty, unsupported, or nonconcurrent interpretations and decisions of other participants.

Concerning the second function, the MIP Management Team must plan and manage process elements (i.e., concurrence-based strategic planning and team-building) that are key to the success of the intervention: they are the mechanisms through which participants develop, first, a common understanding of issues, then a common vision, and finally, the team approaches needed to address complex problems – all the while, building mutual trust. Some participants, particularly farmers and technical professionals, will tend to focus on and attach greater value to technical diagnosis and problem-solving and be impatient with the process elements. Other factors in their discomfort may be inexperience with process-based, multiparty teams; or other tasks and time demands. Some concerns about process elements were voiced in terms of the time demands and slowing the project's progress or detracting from other project activities. In the interest of fostering the needed communication and trust and of moving the program ahead, it will be beneficial for the MIP Management Team to combine problem-solving with process activities whenever possible. However, it is important to note that although some participants in the demonstration program expressed concern about the degree of emphasis

on process elements, some of those same participants as well as others who were more comfortable with those elements, ultimately recognized the value of such activities.

Major considerations in structuring a management team for the demonstration project were assuring that the team had expertise with MIP processes and with the key technical issues associated with the area's irrigated agriculture. Understanding of the local issues and culture was also deemed important, and therefore, adding local representation to the Management Team was considered early in the process. This was not done, in part because long-range stakeholder roles and local MIP leadership had not been detailed, and in part because local representatives who would devote adequate time to the pilot had not yet emerged.

Some participants' view of the Management Team as "outsiders" and the lack of local representation on the Team may have lessened the sense of ownership of the process. Also, because the Management Team had no local representative, the local control group emerged separately from the team. Consequently, it is recommended that future MIP applications consider a more evolutionary approach to MIP Management Team development. Starting with some "local" representation, which would increase over time, the original management team would ultimately become the "local" MIP Management Team. Strategies to develop locally the technical, managerial, and facilitative competencies required to carry on the process in the long term need to be considered during the local team's emergence. Further details on the evolution of this group are provided in a later section.

Local leadership

The initial work agreement envisioned that a complete cycle of diagnosis, planning, implementation, and assessment would be completed under the guidance of the MIP Management Team. Following the DA and planning phases, stakeholders were expected to establish long-term agreements under which ongoing collaborative activities would be supported and others developed in the future. Farmer participation was considered critical, but the work agreement did not specify who those farmers would be, how they would be recruited, or the extent of their roles. The need for external support after the formal demonstration was not explicitly considered.

Dedrick et al. (2000a) summarized the demonstration program's management planning and implementation phase activities. As was stated before, the planning workshops produced two specific initiatives. Other issues remained to be addressed.

During the summer of 1992, the MIP Management Team continued the planning initiated at the end of the DA by requesting program ideas from

participating agencies. The Team also met with a select group of stakeholders. During this period, the need for interagency coordination was identified by several stakeholders. Consequently, during a meeting in August 1992, the MIP Management Team suggested that a work group be formed to explore the development of a local coordinating stakeholder group that would sustain the program beyond the formal demonstration. Farmers who had shown significant understanding and interest in the process and agency representatives with operational responsibility in the MSIDD area were invited to participate in this work group.

This group, named the Interim Coordinating Group (ICG), met over the following 10 months during which they developed an institutional framework for the local MIP leadership. The MIP Management Team facilitated these meetings and guided the group through the development of a charter and a strategic plan. The ICG's vision for the local leadership group centered around (1) coordinating the MIP, (2) fostering communications between agencies and farmers and among the farming community, and (3) developing programs addressing on-farm profitability and sustainability.

There were anticipated difficulties in establishing the leadership group, particularly related to the role of the group leader. Farmers and the district management were concerned about the time demands of assuming a leadership role. Agency representatives were concerned that the potential MIP leadership responsibilities would conflict with their mandate to serve an area broader than MSIDD. Early in the leadership discussions, co-leadership was considered. The logical co-leader would have been the MSIDD general manager, since the district boundaries defined the MIP boundaries. Ultimately, both groups agreed that farmer leadership was the most appropriate.

The position of the district's BOD in these discussions is of interest. The MIP had already provided tangible benefits to the district and its farmers. In particular, two BOD members had been involved in the activities of the work group addressing water costs and assessments, and this group identified alternatives for reducing the impacts of the high water costs to the farmers. However, members of the district's BOD were reluctant to assume the leadership role (a member of the BOD likely would have been a farmer) or to allow the district's general manager to assume that role. At least three factors account for this reaction. First, there was concern by the other ICG agency members, including the MSIDD general manager, as to the appropriateness of co-leadership, with most favoring a single-farmer leader. These discussions led to the decision to select a farmer leader. Second, at the time, the district was involved in critical negotiations with state and federal agencies to resolve the economic problems confronted by districts served by the Central Arizona Project, a large federal water project due to invoke a clause requir-

ing districts to pay for water allotted them whether or not they accepted it (Wilson and Gibson 2000). Thus, the BOD was concerned about the amount of time needed to attend to those pressing issues. Third, the BOD itself was experiencing leadership and membership changes. The board underwent two leadership changes during the demonstration. Hence, they continued to support the process through the general manager's membership in the ICG but minimized their own direct involvement in day-to-day ICG activities.

The ICG officially became the local Coordinating Group in late 1993 and continued to operate until mid-1998. During its first three years, the group was very active in its communication role, promoting several open-house meetings with farmers, publishing a newsletter, and supporting the development of area-wide initiatives such as the creation of a pest control district. The open-house meetings focused on technical and economic issues of interest to district farmers. Furthermore, this type of activity influenced the development of an interorganizational group at the county level, which met regularly and included not only government agencies but also finance organizations, to share information and discuss current agricultural conditions in the area.

Throughout its existence, the group underwent transformations with the addition of new members and changes in leadership. At first, these changes did not impact the group's effectiveness. However, in later years, diminished farmer participation and agency personnel changes made it more difficult for the group to maintain its identity. Overall, members' interest in the group's activities gradually waned.

Some general lessons can be derived from the above discussions:

- As noted in an earlier section, the lack of a phase-out plan for the MIP Management Team significantly influenced the way in which the leadership group emerged and the timing of its emergence. The breadth of the application may have contributed to this difficulty as well. In an MIP initially driven by a specific local need, the local leadership group might have emerged earlier under the guidance of the MIP Management Team.
- While the Coordinating Group had limited success in promoting formal interagency agreements, it served as an effective forum for information exchange and spawned informal information exchange activities within the district (a farmer-to-farmer discussion group which is still active in the area) and at the county level. Thus, valuable information exchanges can result from such informal activities.
- Although the district did not assume the leadership role of the Coordinating Group, the Coordinating Group's activities influenced organizational changes within the BOD. At the request of the district's general manager, BOD members participated in an organizational retreat in 1993 during

which they defined a new mission statement for their organization. Many of the concepts embodied in the Coordinating Group's mission statement were incorporated into that of MSIDD. Similarly, agency representatives reported gaining a new perspective on their organization's mission. So, while a group such as the Coordinating Group may be difficult to institutionalize, the process can formally and informally affect the organizational mission or the interpretation of that mission of existing organizations.

- Maintaining farmer participation in the process is an important concern. In the demonstration project, 40 farmers (about half of the total farmer population in MSIDD) participated in various phases of the project; seven, including two BOD members, participated extensively in the planning and implementation phases. Members of this smaller group were key contributors to the process and provided a powerful incentive for continued agency participation. During the Evaluation Study and also during later activities and individual discussions with participants, farmers acknowledged the positive contributions of the MIP and of the Coordinating Group. Still, as indicated earlier, farmer participation in the Coordinating Group diminished over time, and the Coordinating Group was largely unsuccessful in recruiting replacements. Reasons mentioned by participating farmers include time demands, the difficulty of measuring the benefits of these types of activities, and indifference. Farmers who played significant roles in the pilot process, and particularly in Coordinating Group, stated that they did so more from a sense of duty to their community than from perceived personal benefits.

- During the Coordinating Group's formation, transitional procedures were developed to replace departing representatives and to recruit and initiate new members properly. However, the process was never formally implemented by the Coordinating Group. With changing membership, the need for structured transitional approaches and facilitation became critical and illustrates the need for the MIP Management Team to assure that these skills are developed. Successful membership transition approaches and the skills to apply them are key to the sustainability of the MIP.

In summary, during the initial project planning, MIP participants need to consider the development of a local management team that will provide MIP guidance after the formal MIP intervention is complete. Consideration also needs to be given to how the program will be transferred to this team and the subsequent support or advisory role of the MIP Management Team.

Evaluation of the MIP application

There is a significant body of literature on the subject of evaluating social/organizational development projects such as the MIP (e.g., Nadler 1977; Rossi & Freeman 1985; Casley & Kumar 1987). Evaluations are conducted not only for accountability purposes, but also to provide feedback for program improvement or as part of the organizational development process. Evaluations face conceptual challenges, the most important being a clear initial agreement among the interested parties on the evaluation's purpose and process and ownership of the resulting data. There are also practical difficulties, key among them issues of cost/benefit, difficulty in measuring the effect of organizational policy and program changes on the intended beneficiaries' practices, and timing of the evaluations as they span a period that is much shorter than the period over which organizational changes become institutionalized and start producing benefits. As noted earlier, the initial planning did not define how program impact would be measured. Consistent with action research principles, the assumption was made that assessments of periodic data collection and feedback would guide the MIP application. Also, it was assumed that specific initiatives would develop their own performance measures.

Review sessions were carried out throughout the Diagnostic and Planning phases with the Interagency MIP partners, the district, and various participants in the demonstration application. Interest in documenting program impact prompted an evaluation study.

Details of the evaluation study are provided in LeClere et al. (1994). Initial planning for the evaluation study was carried out by the MIP Management Team in consultation with the agencies that sponsored the demonstration project and the local MIP oversight group. In mid-1993, a three-member team was established to carry out the evaluation. The evaluation team, whose members are also among the authors of this paper, was composed of an external consultant, who served as team leader, and two members of the MIP Management Team. Inclusion of the MIP Management Team members facilitated interpretation of the data in light of the long and complex nature of the Demonstration MIP. The field study was carried out through interviews of participants and of nonparticipants who were aware of the ongoing MIP activities and surveys.

The Evaluation Study (Le Clere et al. 1994) was successful in the following respects:

- It documented short-term impacts of the MIP on the district, farmers, and participating agencies.

- It demonstrated the value of MIP principles of shared understanding, communication, and collaboration.
- It identified process strengths and shortcomings, as it was applied, and specific recommendations for improvement. This article derives largely from those recommendations.
- The study also provided feedback to participants. This information was particularly valuable to the local Coordinating Group who had assumed control of the process.

The evaluation study was less successful in the following ways:

- It did not produce the range of quantitative measures of impact that some participants had desired.
- It did not propose a process for monitoring long-term impacts.

Clearly, the most important learning in this area was that decisions regarding how the MIP's success will be measured need to be made very early in the process. In accordance with the MIP's Action Research character, the data to be collected should be useful in advancing the managed change process itself and also should provide quantitative indicators of performance. These ends require early establishment of appropriate baselines, monitoring during the course of an MIP, and if required, formal evaluation at the conclusion. Variables to be monitored or evaluated need to be derived from the application's purpose and intended outcomes and should cover the range of technical, managerial, and model-building aspects of the MIP.

Summary and discussion

A common theme in the above lessons is the uncertainty inherent in the application of a managed change process to an agricultural system. This uncertainty is due mainly to three factors: (1) the natural complexity of agricultural systems in that interdisciplinary and interorganizational approaches are needed to assess the system's performance and identify opportunities for improvement; (2) the difficulty in developing solutions to the key issues affecting agricultural systems and in predicting or measuring their impact, even if the key issues are clearly defined; and (3) the need to address those preidentified problems while potentially addressing a broader range of long-term issues specifically relevant to learnings from the DA phase of the process. This latter factor was clearly seen in the MSIDD demonstration as stakeholders repeatedly used the process to respond to emerging issues, which contributed to both the overall MIP performance goals and the acceptance of the process, but distracted the application from its initially stated objectives.

Thus, an MIP application has to be framed to address the pre-identified issues with flexibility to respond to proposed alternatives within the broader agricultural system.

Another common theme is that despite this uncertainty, early and clear decisions about the program's scope, process, and expected outcomes are essential. Because early decisions must be made with limited information, it is critical that the MIP be presented as a long-term multi-stage process, with the initial intervention being the first stage. During that initial stage, participants would pursue a set of well-defined objectives while becoming familiar with the MIP approach. Issues identified through the Diagnostic Analysis and planning phases would then provide the seed for further MIP activities, each with a life cycle of its own. Expectations for the entire intervention must be appropriate and clearly defined to meet the local goals. Such explicit definition among sponsors and participants will assure clarity of duration, costs, and potential benefits.

The discussion in previous paragraphs also indicates that some of the challenges confronted by the demonstration MIP were due to the research nature of the application. A more likely scenario for future applications, as was noted earlier, is that an MIP would be sought by a stakeholder group with some specifically defined objectives in mind. In such situations, carrying out the initial planning, identifying expected outcomes, defining the role of management team, and identifying the initial local leadership should be more straightforward. The challenge in those more likely scenarios would be to guard against defining an MIP application too narrowly such that important elements of the agricultural system would be ignored.

One of the keys to the success of the MIP is identifying participants and defining their roles. If the appropriate individuals are involved in the appropriate activities, then effective participation will be easier to achieve. Participants must understand that the MIP approach departs from traditional "expert" diagnosis and problem-solving approaches in that it is interdisciplinary, involving all affected parties, and relies heavily on qualitative data. Participant involvement is crucial to the interpretation of data and development of alternatives to the identified problems. Therefore, the MIP Management Team must insist on participatory planning and implementation with all parties involved. In the pilot MIP, changes implemented unilaterally by MSIDD might have been achieved with greater impact if MSIDD had earlier understood the value of the MIP's collaborative processes and had involved farmers and field operators in the exploration of opportunities for improving water delivery.

A final lesson from the demonstration program was the value of symbolic elements as a tool for creating and maintaining focus on the agricultural

system as a whole. Figure 1, referenced earlier in the section, "Bringing participants on-board," was developed during the transition from the Diagnostic Analysis to the Management Planning Phase and served as a symbolic guide during the Demonstration MIP. Besides being invaluable as a focusing tool, the diagram reminded stakeholders of their roles and of the links in the agricultural system. The schematic was a significant lesson learned from the pilot MIP. Such a relational diagram should be used throughout an application of an MIP, beginning in the initial exploration with clientele potentially interested in applying the managed change process to improve the performance of the area's agricultural system through the three phases of the MIP. Such an approach will assure proper focus of all entities and will enhance the lessons learned reported in this paper.

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Appendix A: Initial definition of the management improvement program developed during 1990

I Purpose

Evaluate water resources management in irrigated agriculture with respect to economic and environmental quality considerations through a coordinated effort. The focus of the effort is to identify opportunities for improvement in farm, district and government agency actions, policies and regulations and to implement and evaluate appropriate changes.

II Intended outcomes

A Improved communication and collaboration among farmers, districts and government agencies, resulting in strengthened working relationships and elimination of duplication of roles among agencies.

B Better understanding of the current status and problems/opportunities of water resource management, including district operations and on-farm water management and the similarities and differences among districts.

C Identification, selection and implementation of alternative actions (activities, research/educational programs, policies, regulations and operations of farmers, districts and agencies) to improve farm irrigation management (water scheduling, water application, chemical application, crop selection), farm irrigation system (design methods and structures), and water delivery system operations and management.

Success to be measured by:
- energy conservation
- improved water performance (savings)
- improved water quality (ground and surface)
- increased productivity of water, soil and energy resources

D Increased farmer profit/benefit.

E Increased understanding of the MIP process as a tool to apply in a range of situations.